The Design of Flexible Video-Based Crossmedia Informal Learning Contexts Beyond iTV

Alcina Prata
Superior School of Business Administration (ESCE)
Polytechnic Institute of Setúbal
2914-503 Setúbal, Portugal
+351265709429
alcina.prata@esce.ips.pt

Teresa Chambel
LaSIGE, Faculty of Sciences
University of Lisbon
1749-016 Lisbon, Portugal
+351217500087
tc@di.fc.ul.pt

ABSTRACT
In the last few years, iTV has been gaining increasing attention from researchers, TV operators and the general public, due to its potential in entertainment, and also in communication, health, and learning, made possible by technological advances and better interface and services design. In particular, the convergence and use of different devices as part of the same crossmedia system is creating new opportunities to support a multiplicity of contexts of use. On the other hand, the lifelong learning era, which is taking place in a wide variety of contexts and locations, calls for flexible environments. TV is a privileged way to watch video - a very rich medium, in cognitive and affective terms, to convey information and support learning and entertainment, like no other medium. However, by being traditionally watched in a more experiential and passive cognitive mode, TV and video are limited in their capacity to fully support learning. But they may induce viewers to engage in more reflective modes, that can be supported to some extent by their adequate design, in interactive contexts and augmented by other media and devices, in diverse situations. The inclusion of iTV as part of rich and flexible crossmedia learning environments brings new opportunities in this respect, but also comes along with challenges that may affect their effective use.

This paper aims to contribute in this direction, by exploring what contributes to the effective design of services and interfaces for video-based crossmedia informal learning contexts that go beyond iTV, taking the best of each device involved. The eiTV application case study presented was designed to illustrate and explore this paradigm, based on cognitive and affective aspects that influence user experience. It is capable to create, edit, delete, access and share web personalized informal learning environments (created as additional information to the video being watched), via iTV, PC and mobile devices, depending on the preferred or most adequate device in each context of use.

Categories and Subject Descriptors
H.5.2 [**Information Interfaces and Presentation**]: User Interfaces - *Evaluation/methodology, Graphical User Interfaces (GUI), Interaction Styles, Prototyping, User-Centered Design*.

General Terms
Design, Experimentation, Human Factors.

Keywords
iTV, iTV learning, iTV interaction, iTV services, HCI, crossmedia, crossmedia design, transmedia design.

1. INTRODUCTION
TV is a privileged way to watch video - a very rich medium, in cognitive and affective terms, to convey information and support learning and entertainment. In spite of being traditionally watched in a more experiential and passive cognitive mode, it may induce viewers to engage in more reflective modes, although not usually providing an adequate support for this mode. When watching a TV program, at some point in time, the viewers may feel the need or will to know more about a specific issue that caught their attention. Traditional TV is not able to support this type of functionality, but iTV, by its nature, may allow the possibility to access and interact with information about the program and related issues, that may be available as indexed TV content and references to follow and search. In fact, the role that TV has been playing so far is changing. We are definitely in a moment of transition, a moment where "old media systems are dying and new media systems are being born. The traditional 'spectatorial' culture is giving way to a participatory culture" [16].

The proliferation of new devices able to support human activities across a range of contextual settings [50], just like it happens in 'real life', is one of the main motivations for media integration in what is designated as crossmedia. Simultaneously, global access to information and technology is changing the relationship between people and knowledge, and the trends in convergence, integration and co-existence of various media technologies is creating new opportunities for the globalization of learning and communicational practices. Crossmedia systems are particularly interesting in what concerns the opportunities they create in terms of communication, entertainment, learning, and other activities [4]. In terms of learning support, these systems are particularly promising due to the emerging era of lifelong learning, as learning will take place in a wide variety of contexts and locations and informal learning will tend to become as important as formal learning [4], calling for flexible environments.

However, there are aspects that affect the efficient use of crossmedia systems. Some of the proposed systems failed because too much effort was put into technical details, leaving behind crossmedia conceptual aspects such as interaction and service design based on: cognitive processes, usability, affectivity, user experience, contextualization, continuity, media affordances, or device characteristics. The handling of these dimensions is our main motivation. Our main concern is to focus on these conceptual aspects, to study and understand this emerging paradigm which success requires, not only technological

solutions, but sustainable models and pedagogical solutions, where research has not been complete [42; 50].

So, it was expected that the eiTV application would be designed to illustrate our research, and also to allow us to propose a new and personalized technical solution for a new type of service. The eiTV crossmedia application, provides viewers with the possibility to choose which topics, from a video, they would want to know more about, with which level of detail, and later decide when and where to access those extra related web contents in a more reflective mode, and whom they would want to share them with (e.g. facebook contacts), having the adequate support from the application in the different access contexts. This is a personalized experience since the contents will be prepared based on the viewers immediate interests and their preferences expressed in their profiles, and is accessed through iTV, PC and mobile devices. The conceptualization, prototyping and evaluation of the eiTV was the main goal of our work.

Section 2 includes a review of related work and concepts. Section 3 describes the conceptual framework found relevant for the design of crossmedia systems in this context. Section 4 presents the design of the eiTV system, using an human-centered design approach and addressing the crossmedia design challenges, evaluated in section 5, through low and high fidelity prototypes in iTV, PC and mobile devices. Finally, section 6 presents the conclusions and perspectives for future research and developments.

2. RELATED WORK

This section presents more relevant research studies, namely those where additional related indexed information was based on a TV context and those where iTV was used with other devices, namely, as part of crossmedia environments. A comparative discussion on these works vs. our application is also presented.

Dimitrova et al. [11] proposed two systems: MyInfo and InfoSip. Myinfo is a personal news application which extracts specific web content listed in the user profile and displays personalized TV news programs - weather, traffic, etc - on the TV and based on the web content.

InfoSip is a movie information retrieval application which analyzes the movie content and gives audiences information (overlaid onscreen) on such things as "who's the actor?". Both systems were developed based on the belief that, while watching a program, the viewer may feel the need to know more about that story, so a content augmentation application could understand which story was on and provide appropriate, summarized and targeted information and also references, as for instance web links, for further exploration. Both applications offered a new direction for personalization research "where the source of the content is less important then the actual delivered information to the viewer" but both were limited considering that the 'extra information' available was previously categorized and limited to a small number of possibilities. As to our eiTV application, it also has an option with pre-defined categorized 'extra information'. However, viewers have the possibility to go much further considering that while watching the video, they may choose exactly in which topics they are interested in knowing more about, and almost everything that is said in the video is a possible choice.

Nadamoto and Tanaka [29] have developed a 'TV-style presentation' system capable of searching the web, extracting related web pages, automatically transforming the text and image based web content found into audio-visual TV and fusing it with normal broadcasted TV program contents.

Miyamori and Tanaka [28] have developed the opposite idea, i.e., a 'Web-browser-style presentation' system named Webified Video capable to automatically transform traditional TV content into web content and integrating the result with related information such as complementary Web content. Both systems addressed the need of extra and complementary content, however, that content was transformed in order to be integrated with the information source.

In the system from Nadamoto and Tanaka [29], the final result may become much too intrusive of the TV viewing experience since TV is the only device being actually used by viewers. Contrary to eiTV, these two are not offering a personalized solution prepared to react to changes in viewers' cognition modes.

Ma and Tanaka [24] have developed the Webtelop, a 'Parallel presentation" system to present the TV program and web content simultaneously on the TV, enabling viewers to browse web content while watching the TV program.

CoTV™ [8] or coactive TV automatically presents, on a PC, web content related to the on-air program. It acts like a special web search engine that is continuously and automatically driven by the TV-viewing context (not driven by the viewers' actions). It also includes a portal with traditional iTV services, as for instance program guides, video-on-demand, etc. As to the Webtelop it is much too intrusive of the TV viewing experience and CoTV™ is distracting. Due to their characteristics, and contrary to eiTV, none of these two systems provided a personalized adequate answer to viewers needs while accommodating their changes in cognition modes. However, both addressed the need to provide viewers with extra content while watching a TV program and contributed with solutions to integrate web content with TV.

TV2Web developed by Sumiya et al. [51] is a crossmedia system, where a video and its closed captions were structured after being divided into units, such as segments scenes. Units were then linked and displayed smoothly using zooming metaphors and providing a seamless user interface that could be moved between TV screens and Web pages. This approach was interesting since the final interface was developed with the smallest possible excerpts from the original video. In terms of contextualization, the use of small excerpts from the original video achieved good results. However, it was a limited crossmedia system considering the small number of devices involved and interaction possibilities. As to eiTV, we also used video excerpts from the original TV program in order to contextualize the web content. However, different approaches were tested (e.g. video running or paused). As to the number of devices involved, we have spanned our application across iTV, PC and mobile devices environments.

A system proposed by Miyamori et al. [28] generates views of TV programs based on viewer's perspectives expressed in live web chats where they express their emotions about the TV programs. This work was an attempt to integrate TV and the web in a personalized way and taking into account important dimensions as the emotion and the sense of unity. In general terms, they defended the role of these two dimensions in the design process